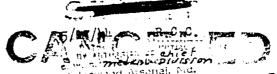
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Info. Div., CWS Tuest. Command. A. A.

A Memorandum Report

CYANOGEN CHLORIDE

LC 50 FOR RABBITS: 2 MIN. EXPOSURE

By

E. H. Krackow

I. Fuhr

DECLASSIFIED DOD DIR #200.0

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T.R.L.R. 33 Project A 10.2 Copy No. 1

By authority of the Chief, Medical Division, OC~CWS

#### CYANOGEN CHLORIDE

LC 50 for Rabbits: 2 Min. Exposure

Ъу

E. H. Krackow

I. Fuhr

DOD DIR 5200.0

UNCLASSIFIED

Info. Div., UWS Took. Cond. Forwarded to Chief, Chemical Warfare Service

MAY 8 1 1944



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T.R.L.

#### CYANOGEN CHLORIDE LC 50 for Rabbits: 2 Min. Exposure

Project A 10.2

T.R.L.R. 33

#### ABSTRACT

#### **OBJECT:**

The object of project A 10.2 is to determine the toxicities of standard and proposed chemical warfare agents.

The object of the work described in this report was to determine the LC 50 of cyanogen chloride for rabbits exposed 2 minutes and observed 10 days.

#### RESULTS:

The LC 50 of cyanogen chloride for rabbits exposed 2 minutes has been determined:

The following data were obtained:

Analytical Conc.	Mortality	
mg./1.	Fraction	%
5 <b>.</b> 5	3/10	30
6,3	3/10	30
7。8	8/10	08
9.3	7/10	70
11.1	9/10	90
12,1	9/10	90

#### CONCLUSION:

The LC 50 of cyanogen chloride for rabbits exposed for two minutes and observed for 10 days is estimated to be 7.1 mg./1.

#### RECOMMENDATIONS:

None.





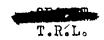
## CYANOGEN CHLORIDE LC 50 for Rabbits: 2 Min. Exposure

Project A 10.2

T.R.L.R. 33

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## CYANOGEN CHLORIDE LC 50 for Rabbits: 2 Min. Exposure

Project A 10.2

T.R.L.R. 33

#### I. INTRODUCTION.

#### A. Object.

The object of project A 10.2 is to determine the toxicities of standard and proposed chemical warfare agents.

The object of the work described in this report was to determine the LC 50 of cyanogen chloride for rabbits exposed 2 minutes and observed 10 days.

#### B. Authority.

Work was done by authority of Chief, Chemical Warfare Service, Project A 10.2.

#### II. HISTORICAL.

Little work has been done on the effects of cyanogen chloride on the rabbit. Marshall and Miller (PR 222) gassed rabbits as well as other species with several different concentrations of cyanogen chloride for varying periods of time. They found that the lethal concentration for rabbits exposed 7 1/2 minutes was 0.85 mg./l. Characteristic symptoms of cyanogen chloride poisoning were observed.

In Ph 1, XLVI, 1, 1918, a similar investigation was reported. The shortest exposure period was 5 minutes. For this time the following results were obtained:

Conc.	Exposure Time	Deaths
mg./1.		
,1.4	5 min.	4/4, 2/4
2.8	5 min.	2/2

#### III. EXPERIMENTAL.

#### A. Materials and Equipment.

Cyanogen chloride was obtained from the Protective Development Division, Technical Command, Edgewood Arsenal. The material was 96% pure. Rabbits were obtained from Orange and Black Farms, Hanover, Pa. They weighed between five and seven pounds.

The 386-1. chamber described in E.A.T.R. 376 was used in these gassings.





#### B. Procedure.

The techniques used in gassing and in determining the analytical concentration in the chamber have been described in T.R.L.R. 27. Ten rabbits were exposed to each concentration. Since the gassing cage held a maximum of six rabbits, two groups of five rabbits were exposed in immediate succession. Before gassing each group of five animals, samples of chamber air were drawn for analysis.

The rabbits were observed closely during and after each two minute exposure. The observation period was 10 days.

#### C. Results.

#### 1. Toxicity

The following data were obtained:

Table 1

t

Toxicity of Cyanogen Chloride to Rabbits:

2 minute Exposure

Analytical Conc. mg./l.	Room . Temp. C.	Rel. Hum.	$rac{ ext{Mortali}}{ ext{Fraction}}$	ity %
5.5	15	34	3/10	30
6.3	20	24	3/10	30
7.8	20	24	8/10 .	80
9.3	18	30	7/10	70
11.1	18	30	9/10	90
12.1	18	30	9/10	90

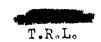
Data from Table 1 are plotted in Chart 1, from which the LC 50 for rabbits exposed to eyenogen chloride for two minutes is estimated to be 7.1 mg./1.

Only three of the 60 rabbits exposed were conscious when removed from the chamber. The other 57 rabbits were either dead or unconscious. Of these, 39 were dead within 25 minutes after they had been introduced into the cyanogen chloride. The remaining 18 rabbits recovered consciousness within 30 minutes after gassing.

#### 2. Symptoms.

In most cases, the rabbits reacted violently 5-30 seconds after being introduced into the chamber. Irritation of the eyes and respiratory tract was evident. Excitement was at a maximum approximately one minute after the beginning of the exposure period, followed shortly thereafter by prostration, unconsciousness





and death. Most of the animals had both tonic and clonic convulsions. Opisthotonos was observed in several of the rabbits. Those that recovered went through successive phases of intense activity and relative quiescence. During activity, the rabbits extended and flexed their limbs rapidly presenting a pattern of coordinated muscular reaction. During quiescence, the rabbits were flaced and occasionally manifested slight tremors. A moderate amount of clear fluid was seen exuding from the nares of the majority of the animals.

After recovery, the rabbits were less active than normal for two or three days. The rate and depth of breathing appeared irregular during this time. After five or six days the animals appeared normal.

#### IV. DISCUSSION.

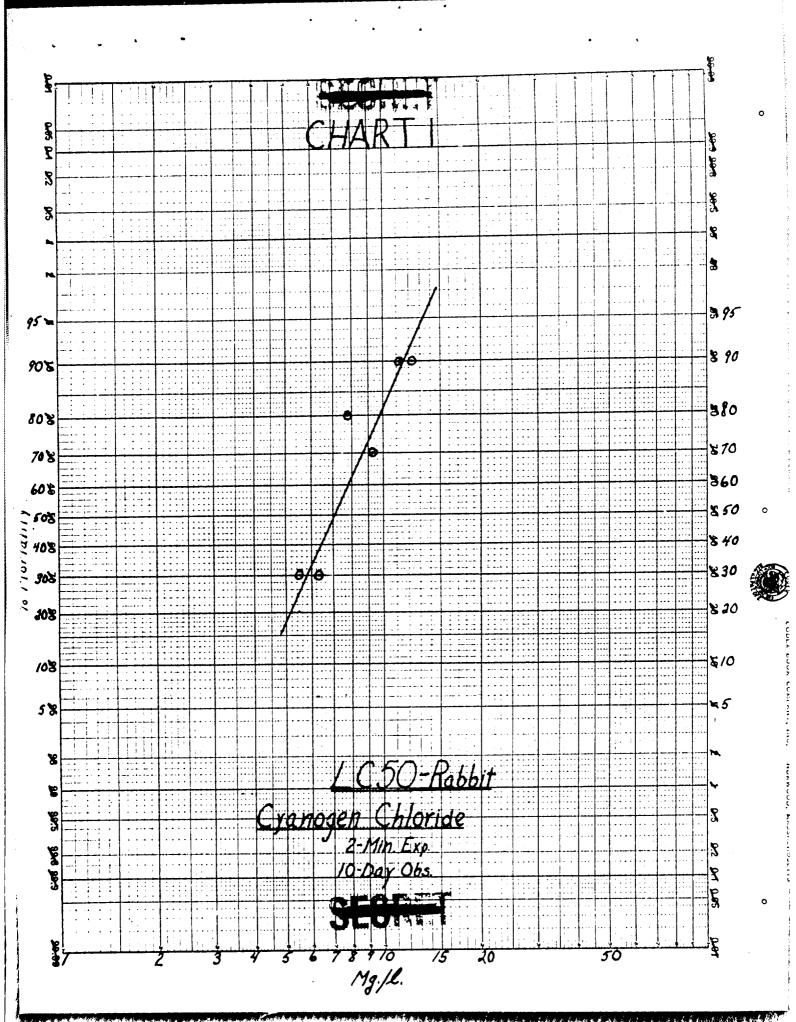
The consistency of the data indicates that the rabbit is a satisfactory animal for inhalation toxicity studies in spite of the facts that the exposure period was only two minutes and that cyanogen chloride is very irritating to the respiratory tract. During the two-minute gassing period the animals were observed closely, and breath-holding was not noted. However, the observations were visual and hence, not conclusive. It was of interest that, although most of the rabbits were greatly excited in the gassing chamber, an appreciable number sat quietly until consciousness was lost. It was of further interest that the three rabbits which remained conscious showed no excitement during exposure.

#### V. CONCLUSION.

The LC 50 of cyanogen chloride for rabbits exposed for two minutes and observed for 10 days is estimated to be 7.1 mg./l.

#### VI. RECOMMENDATIONS.

None.



T.R.L.R. 33

CYANOGEN CHLORIDE LC 50 for Rabbits: 2 Min. Exposure

Project A 10.2

Experimental Work:
Begun: 3 April 1944

Completed: 15 April 1944

Notebook: No. 1867

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REPLY TO ATTENTION OF

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AUG 2 7 2014

MEMORANDUM THRU Director, Edgewood Chemical Biological Center, (RDCB-D/Mr. Joseph Wienand), 5183 Blackhawk Road, Aberdeen Proving Ground, Maryland 21010-5424

FOR Defense Technical Information Center, 8725 John J. Kingman Road, Ft Belvoir, VA 22060

SUBJECT: Internal Request for Change in Distribution

- 1. This action is in response to an Edgewood Chemical Biological Center (ECBC) Internal Request for a Change in Distribution on documents related to cyanogen chloride.
- 2. The listed documents in the attachment have been reviewed by ECBC Subject Matter Experts and deemed suitable for the change in distribution to read "Approved for Public Release; distribution unlimited."
- 3. The point of contact is Adana L. Eilo, ECBC Security Specialist, (410) 436-2063, adana.l.eilo.civ@mail.mil.

Encl

Security Manager

#### Cyanogen Chloride References

- [1] Armstrong, GC, *Toxicity of Cyanogen Chloride to White Mice by Inhalation*, War Department, Chemical Warfare Service, Edgewood Arsenal, MD, 03 March 1933. Unclassified, Dist. D. DoD/Contractors. AD# B956466.
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